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(54) HOME ELECTRONICS SYSTEM ENABLING DISPLAY OF STATE OF CONTROLLED DEVICES IN VARIOUS MANNERS

(75) Inventors: Yoshio Inoue, Hyogo (JP); Shinichiro Ohashi, Hyogo (JP)

Correspondence Address:
McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096 (US)

(73) Assignee: MITSUBUSHI DENKI KABUSHIKI KAISHA

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(57) ABSTRACT

A home electronics system enabling rapid execution of remote control of controlled devices includes a home server, a cellular phone connected to the home server via a public line network, and devices to be controlled controlled in response to a signal from the home server. When the user selects via cellular phone an area, a state or a type of the devices to, the home server creates an image of the current state information showing the state of the devices for transmitting to the cellular phone.

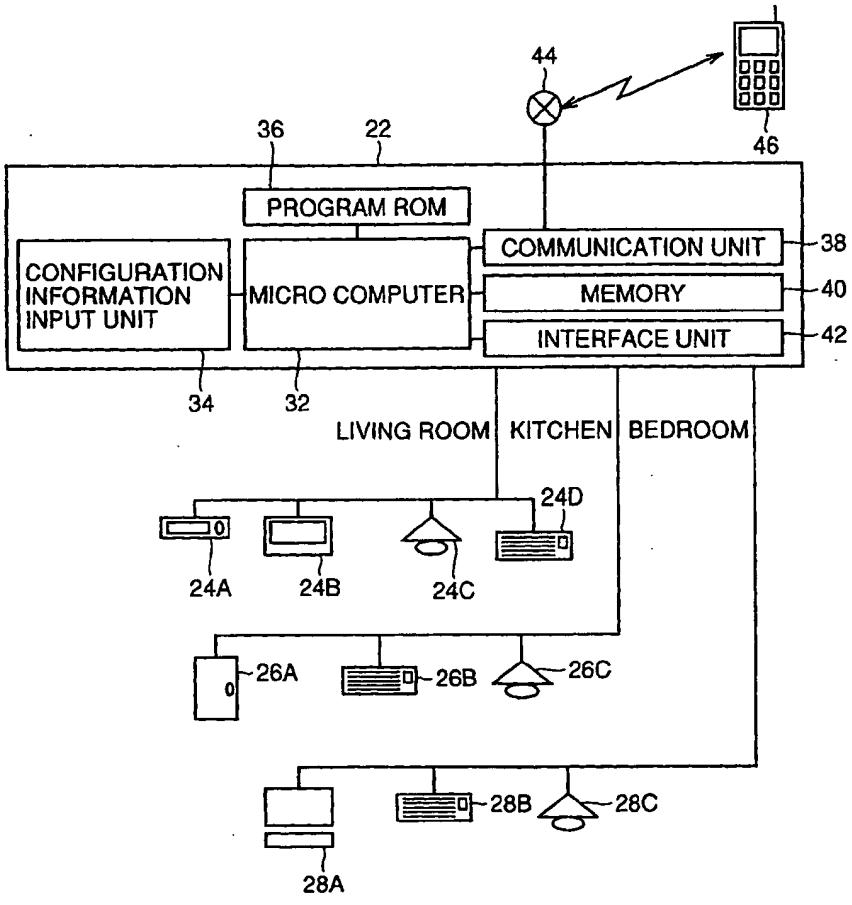


FIG. 1

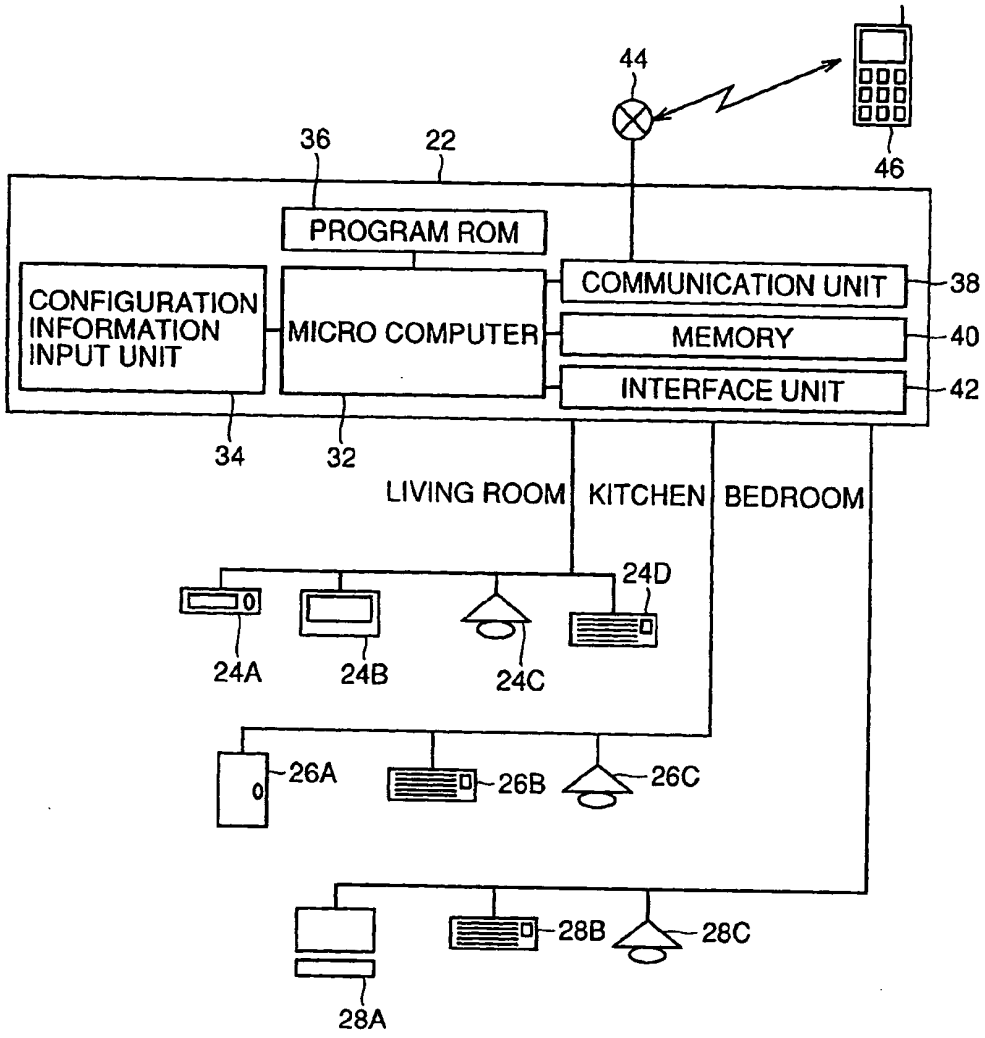

44
46
36
22
PROGRAM ROM
CONFIGURATION INFORMATION INPUT UNIT
MICRO COMPUTER
COMMUNICATION UNIT
MEMORY
INTERFACE UNIT
38
40
42
34
32
LIVING ROOM
KITCHEN
BEDROOM
24D
24A
24B
24C
26A
26B
26C
28B
28C
28A

FIG.2

INSTALLATION AREA	TYPE OF DEVICE	POWER	STATE
LIVING ROOM	VCR	OFF	NO TIMER SET FOR RECORDING
	TV	OFF	
	LIGHTING	ON	
	AIR CONDITIONER	OFF	NO TIMER SET, OPERATION START TIME 0 : 00, OPERATION TEMPERATURE 26°C, HIGH
	SECURITY SYSTEM	ON	
KITCHEN	AIR CONDITIONER	OFF	NO TIMER SET
	LIGHTING	ON	
BEDROOM	PC	OFF	TIMER SET (TURN ON AT 18 : 00, SET TEMPERATURE 28°C)
	AIR CONDITIONER	OFF	
	LIGHTING	ON	
CHILDREN'S ROOM	LIGHTING	ON	
DINING ROOM	LIGHTING 1	OFF	
	LIGHTING 2	OFF	
	LIGHTING 3	ON	

FIG.3

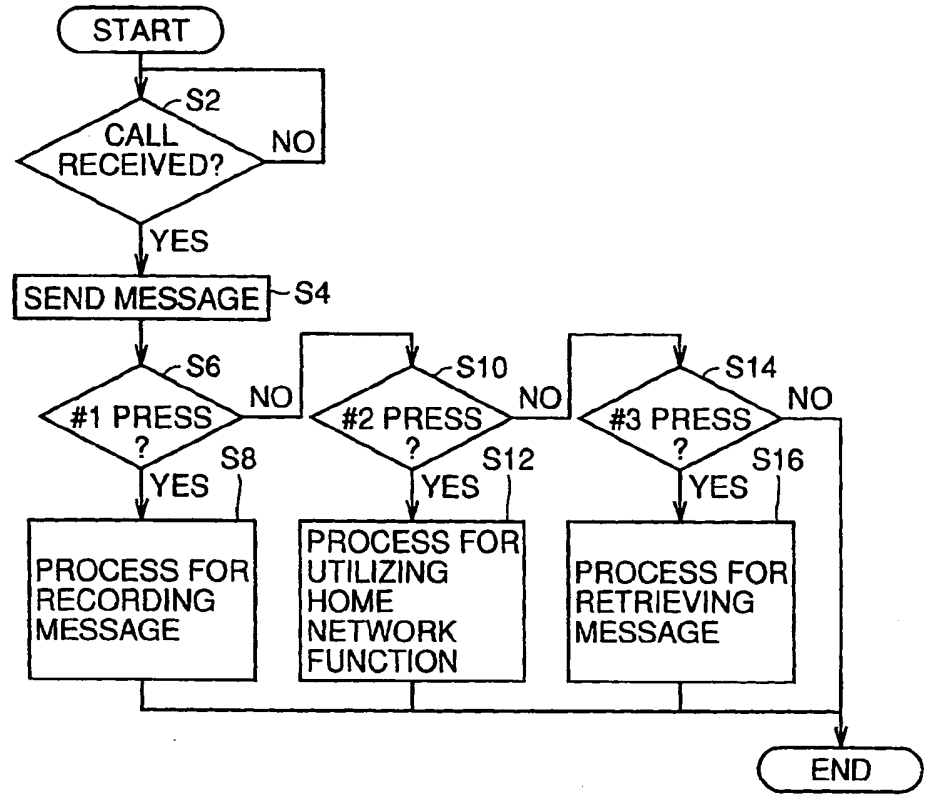

START
S2
CALL RECEIVED?
NO
YES
SEND MESSAGE
S4
S6
#1 PRESS ?
NO
YES
S8
PROCESS FOR RECORDING MESSAGE
S10
#2 PRESS ?
NO
YES
S12
PROCESS FOR UTILIZING HOME NETWORK FUNCTION
S14
#3 PRESS ?
NO
YES
S16
PROCESS FOR RETRIEVING MESSAGE
END

FIG.4A

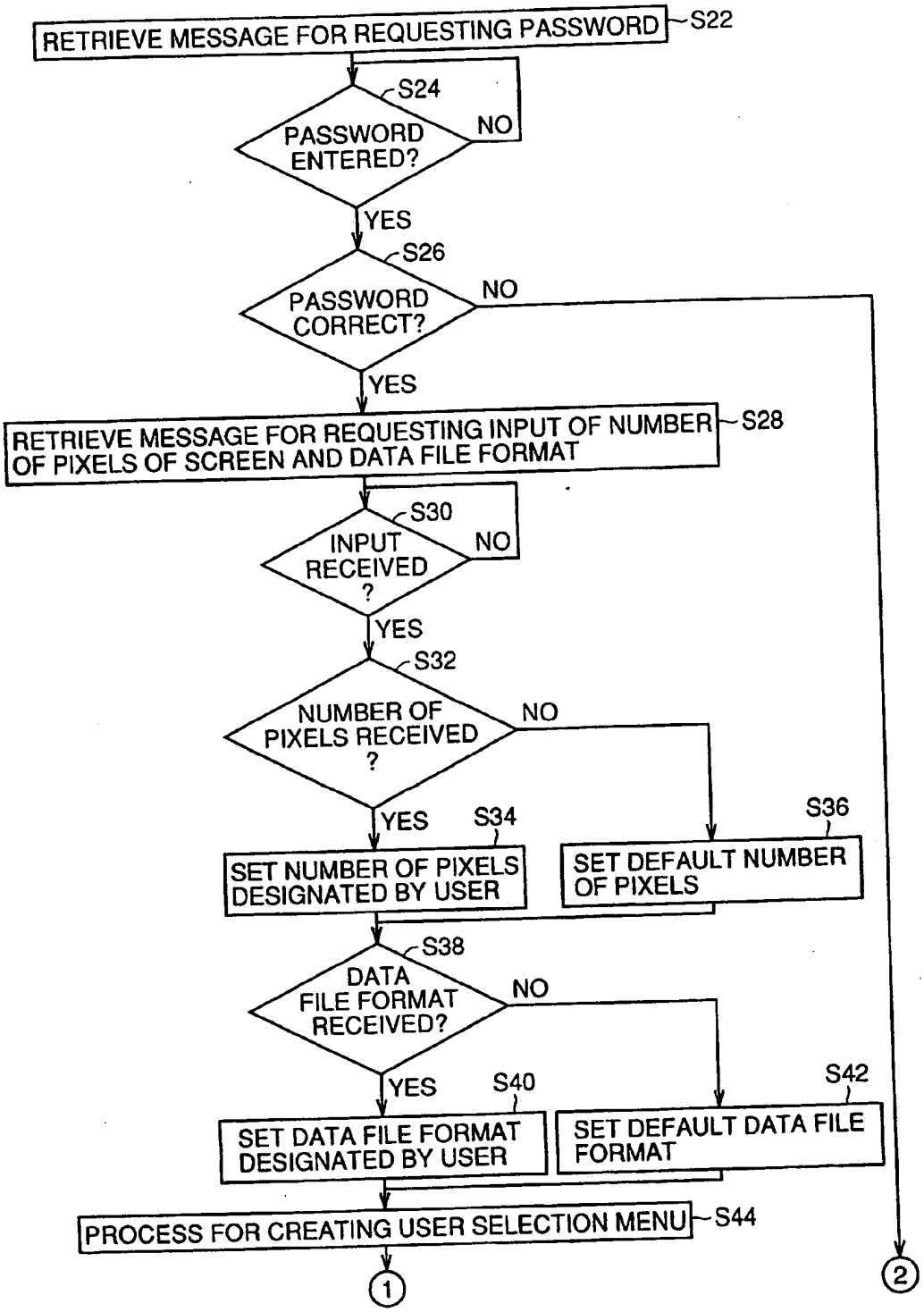

RETRIEVE MESSAGE FOR REQUESTING PASSWORD
S22
S24
PASSWORD ENTERED?
NO
YES
S26
PASSWORD CORRECT?
NO
YES
RETRIEVE MESSAGE FOR REQUESTING INPUT OF NUMBER OF PIXELS OF SCREEN AND DATA FILE FORMAT
S28
S30
INPUT RECEIVED ?
NO
YES
S32
NUMBER OF PIXELS RECEIVED ?
NO
YES
S34
SET NUMBER OF PIXELS DESIGNATED BY USER
S36
SET DEFAULT NUMBER OF PIXELS
S38
DATA FILE FORMAT RECEIVED?
NO
YES
S40
SET DATA FILE FORMAT DESIGNATED BY USER
S42
SET DEFAULT DATA FILE FORMAT
PROCESS FOR CREATING USER SELECTION MENU
S44
1
2

FIG.4B

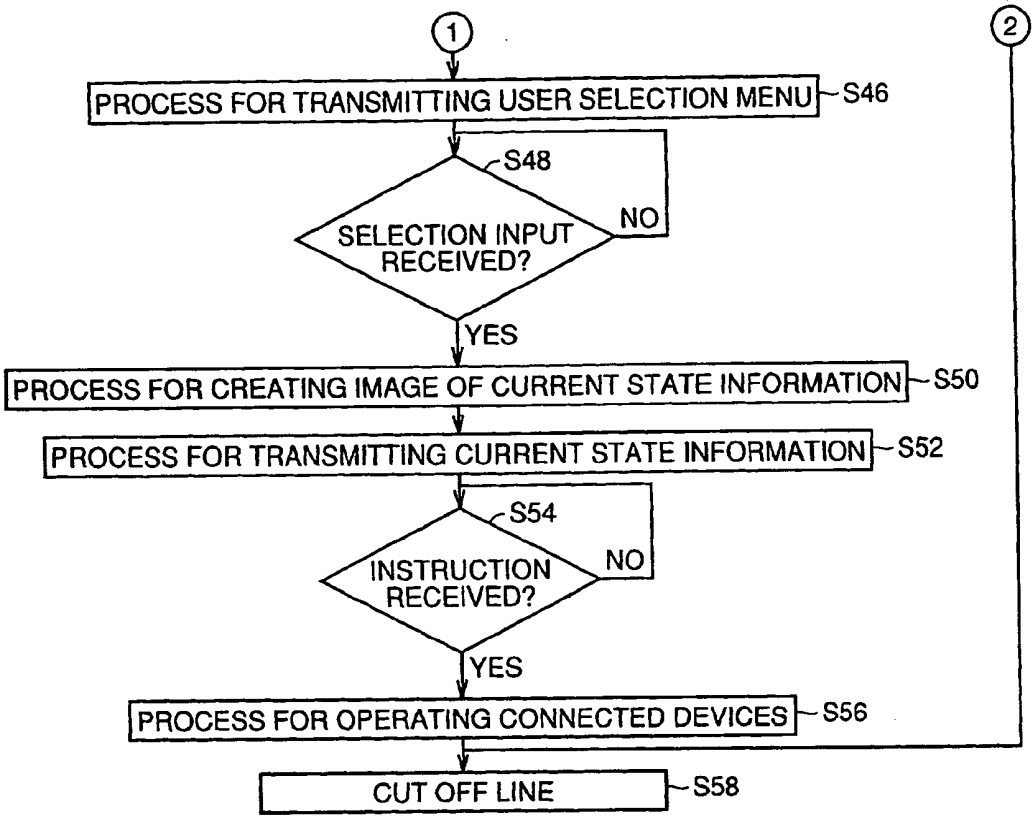

1
2
PROCESS FOR TRANSMITTING USER SELECTION MENU
S46
S48
SELECTION INPUT RECEIVED?
NO
YES
PROCESS FOR CREATING IMAGE OF CURRENT STATE INFORMATION
S50
PROCESS FOR TRANSMITTING CURRENT STATE INFORMATION
S52
S54
INSTRUCTION RECEIVED?
NO
YES
PROCESS FOR OPERATING CONNECTED DEVICES
S56
CUT OFF LINE
S58

FIG.5

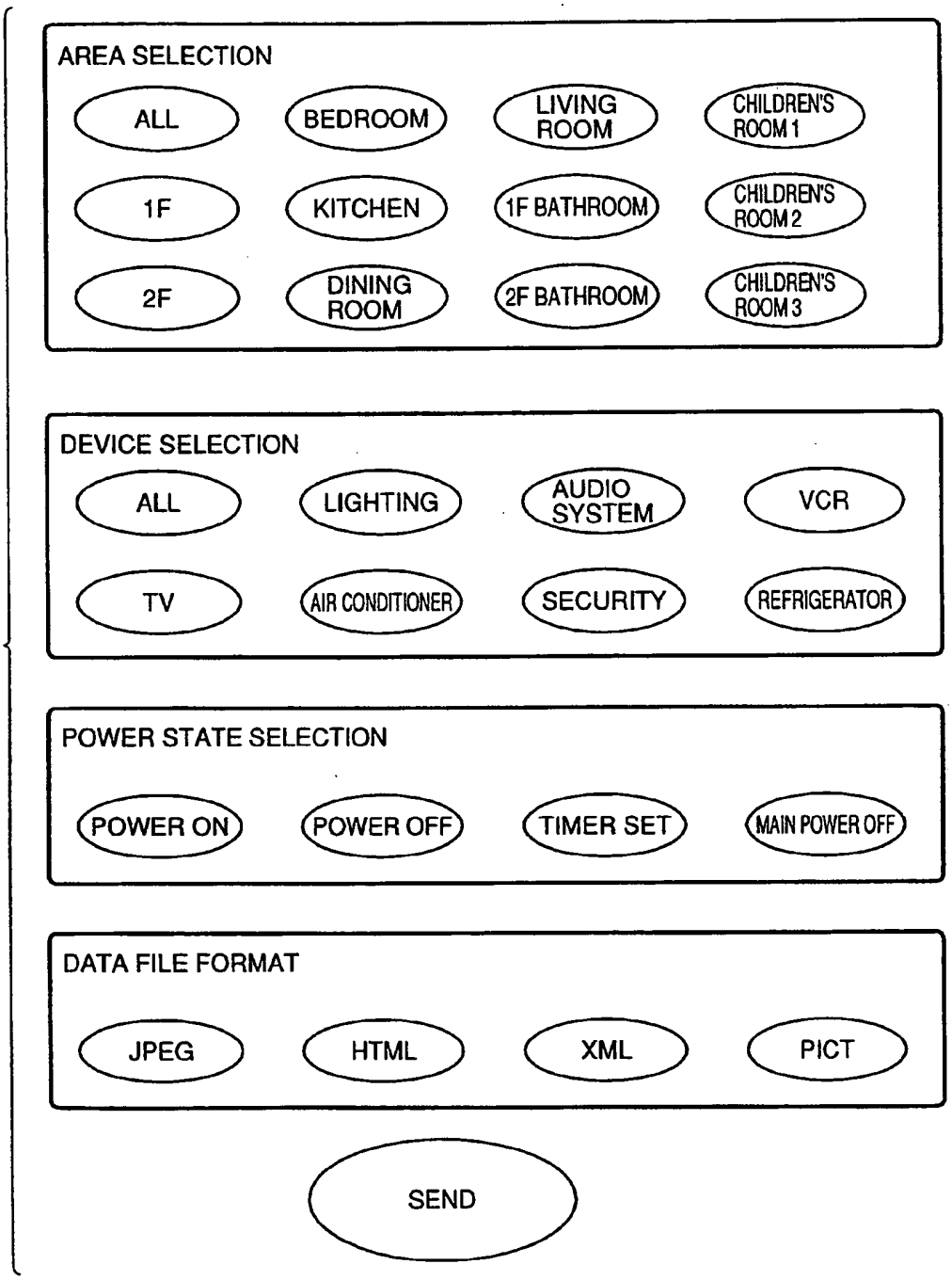
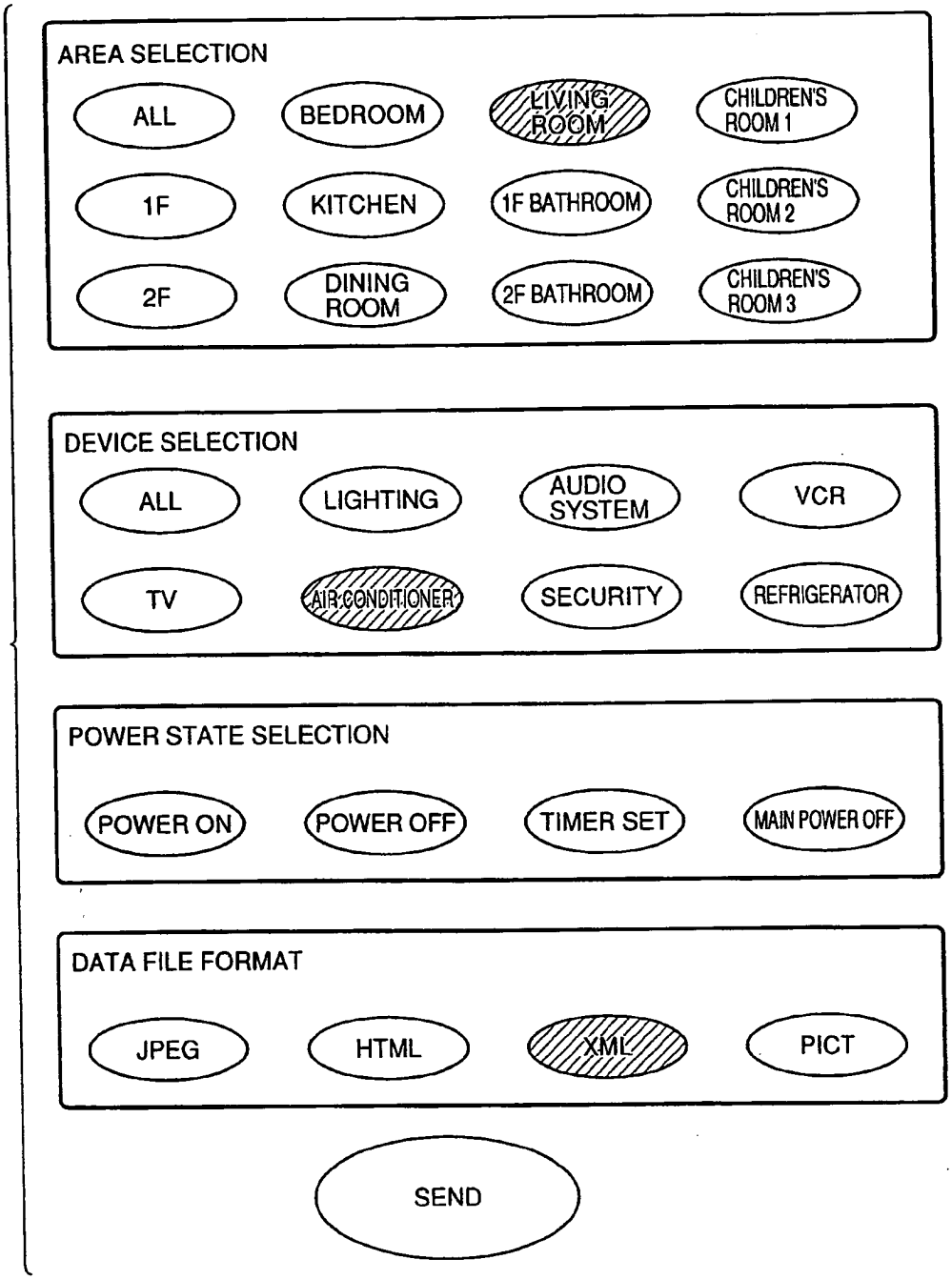

AREA SELECTION
ALL
BEDROOM
LIVING ROOM
CHILDREN'S ROOM 1
1F
KITCHEN
1F BATHROOM
CHILDREN'S ROOM 2
2F
DINING ROOM
2F BATHROOM
CHILDREN'S ROOM 3
DEVICE SELECTION
ALL
LIGHTING
AUDIO SYSTEM
VCR
TV
AIR CONDITIONER
SECURITY
REFRIGERATOR
POWER STATE SELECTION
POWER ON
POWER OFF
TIMER SET
MAIN POWER OFF
DATA FILE FORMAT
JPEG
HTML
XML
PICT
SEND

FIG.6


AREA SELECTION
ALL
BEDROOM
LIVING ROOM
CHILDREN'S ROOM 1
1F
KITCHEN
1F BATHROOM
CHILDREN'S ROOM 2
2F
DINING ROOM
2F BATHROOM
CHILDREN'S ROOM 3
DEVICE SELECTION
ALL
LIGHTING
AUDIO SYSTEM
VCR
TV
AIR CONDITIONER
SECURITY
REFRIGERATOR
POWER STATE SELECTION
POWER ON
POWER OFF
TIMER SET
MAIN POWER OFF
DATA FILE FORMAT
JPEG
HTML
XML
PICT
SEND

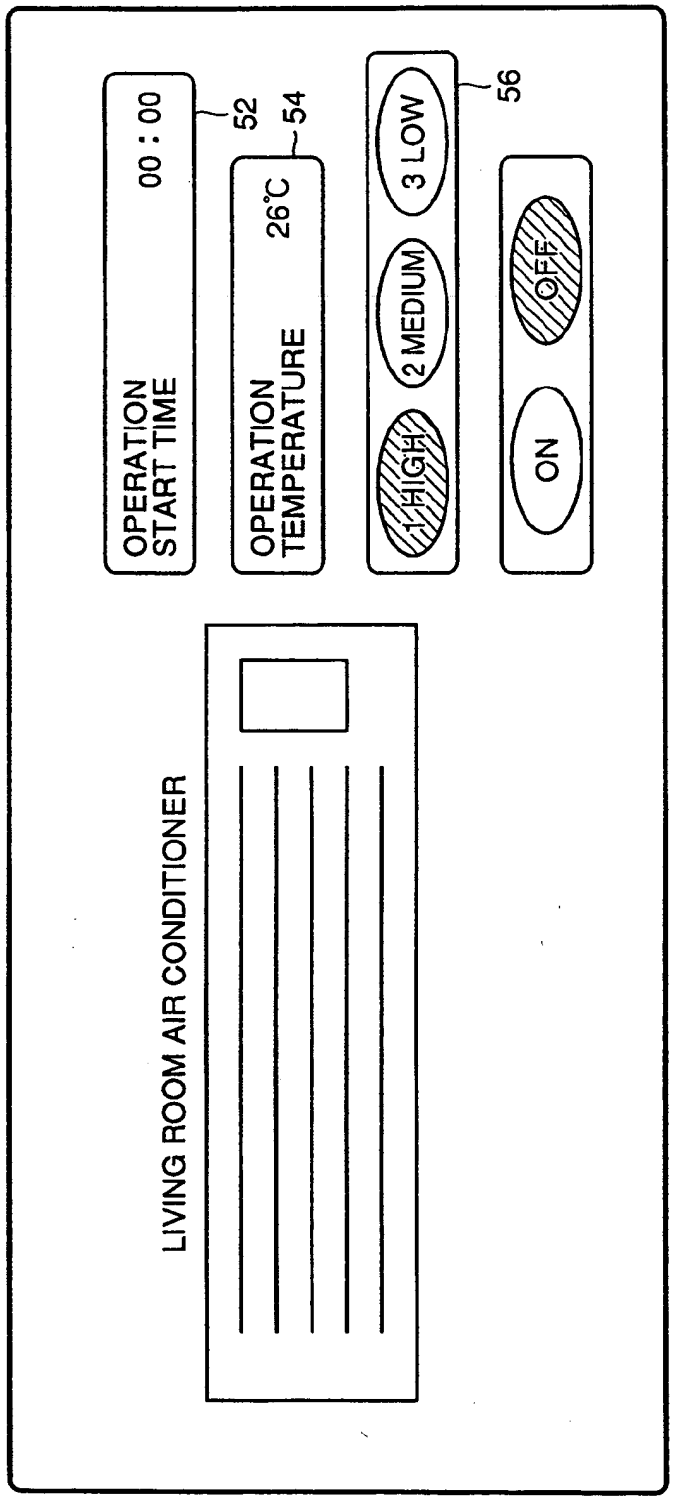

OPERATION START TIME
00 : 00
52
OPERATION TEMPERATURE
26℃
54
1 HIGH
2 MEDIUM
3 LOW
56
ON
OFF
LIVING ROOM AIR CONDITIONER

FIG.7

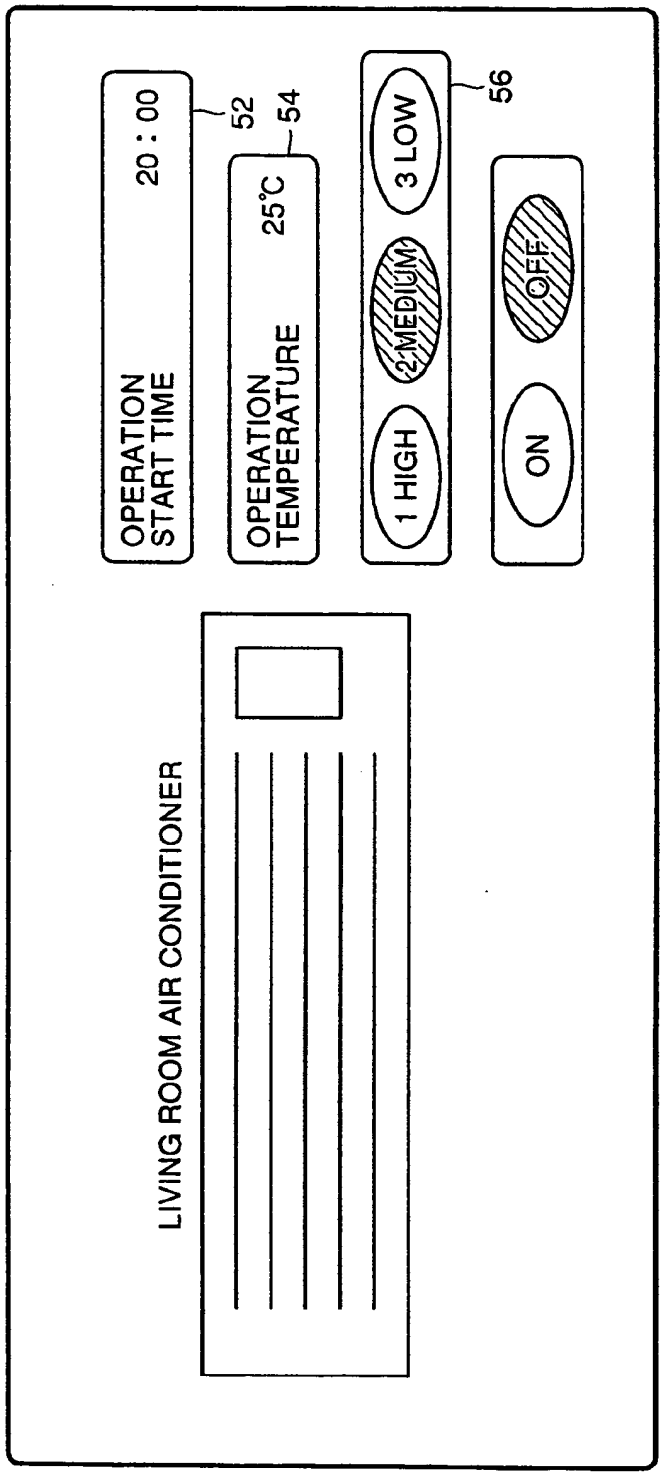

LIVING ROOM AIR CONDITIONER
OPERATION START TIME
20 : 00
52
OPERATION TEMPERATURE
25°C
54
1 HIGH
2 MEDIUM
3 LOW
56
ON
OFF

FIG.8

FIG.9

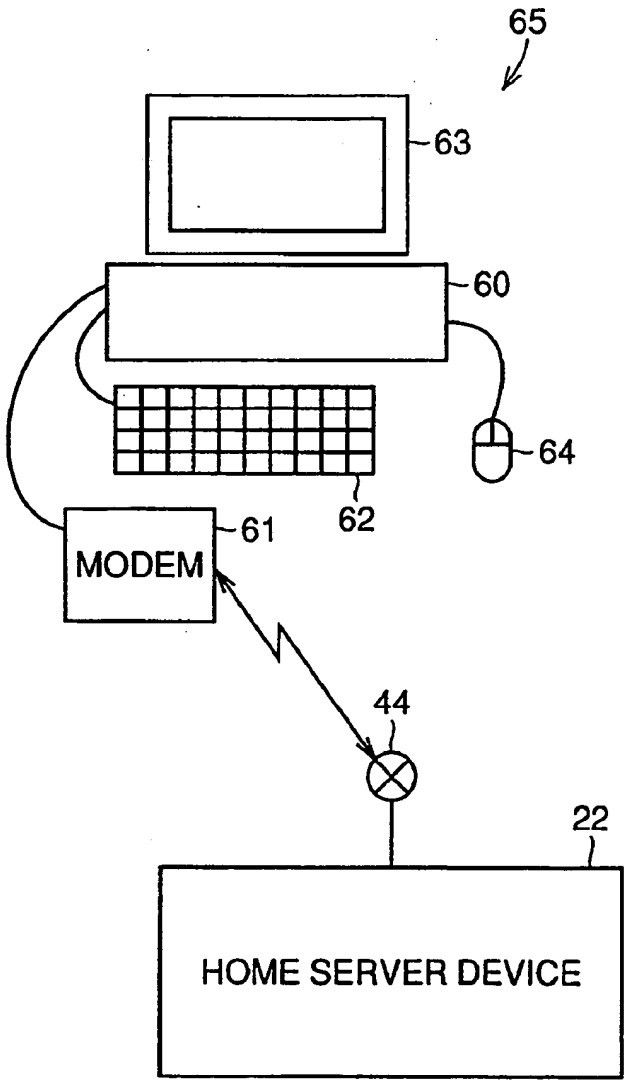
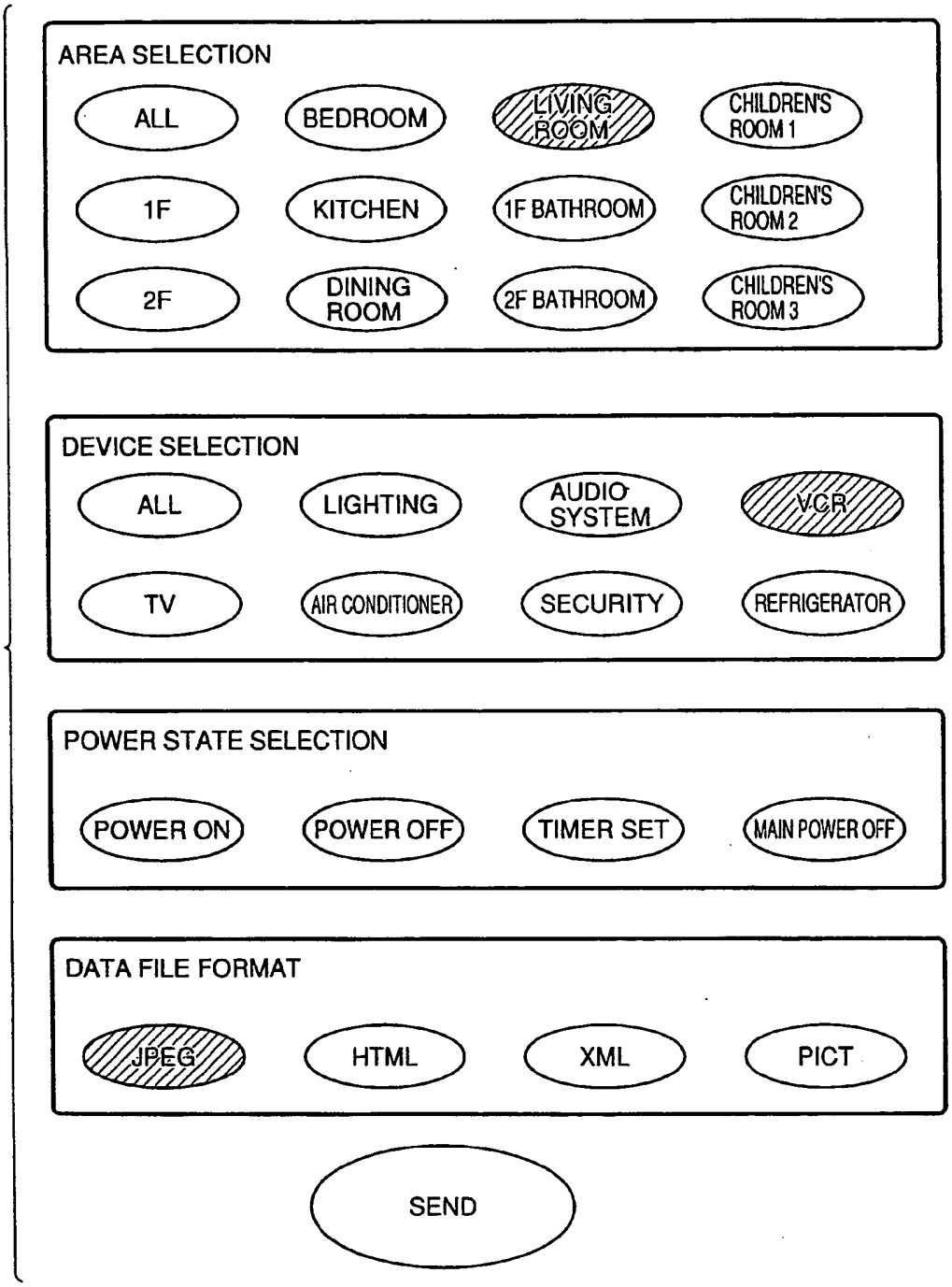


FIG.10


AREA SELECTION
ALL
BEDROOM
LIVING ROOM
CHILDREN'S ROOM 1
1F
KITCHEN
1F BATHROOM
CHILDREN'S ROOM 2
2F
DINING ROOM
2F BATHROOM
CHILDREN'S ROOM 3
DEVICE SELECTION
ALL
LIGHTING
AUDIO SYSTEM
VCR
TV
AIR CONDITIONER
SECURITY
REFRIGERATOR
POWER STATE SELECTION
POWER ON
POWER OFF
TIMER SET
MAIN POWER OFF
DATA FILE FORMAT
JPEG
HTML
XML
PICT
SEND

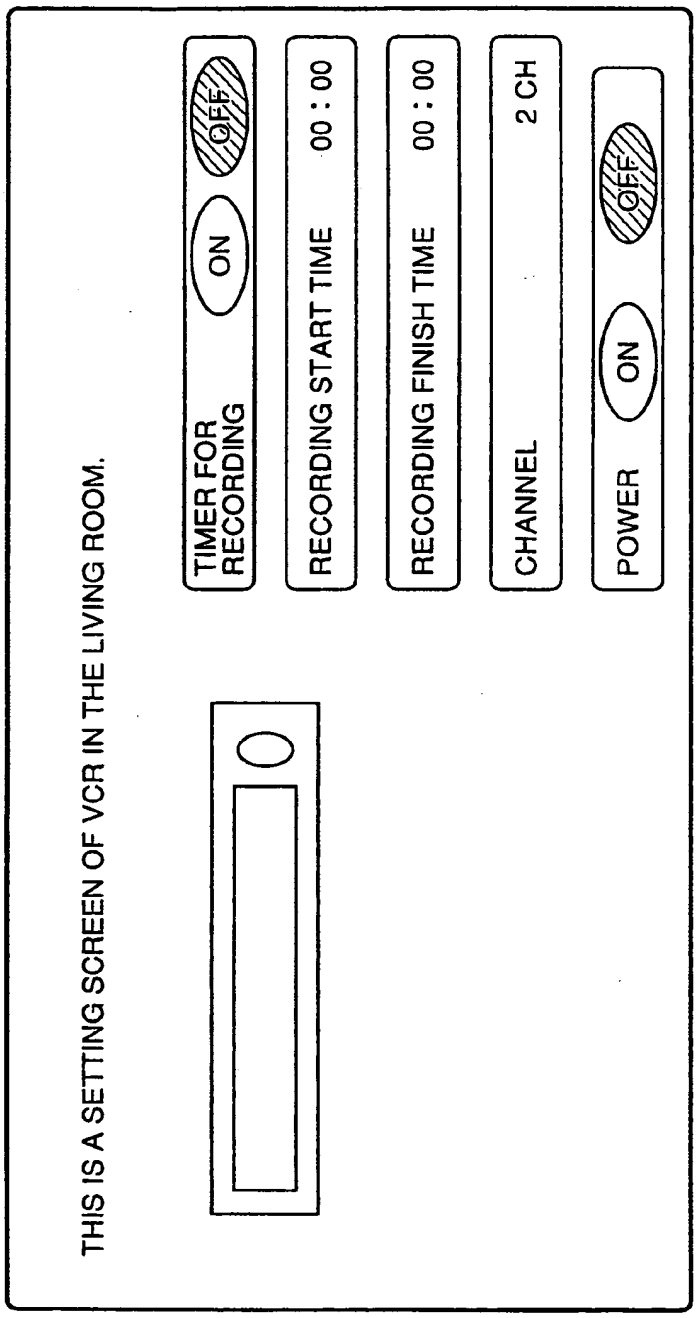

THIS IS A SETTING SCREEN OF VCR IN THE LIVING ROOM.
TIMER FOR RECORDING
ON
OFF
RECORDING START TIME
00 : 00
RECORDING FINISH TIME
00 : 00
CHANNEL
2 CH
POWER
ON
OFF

FIG. 11

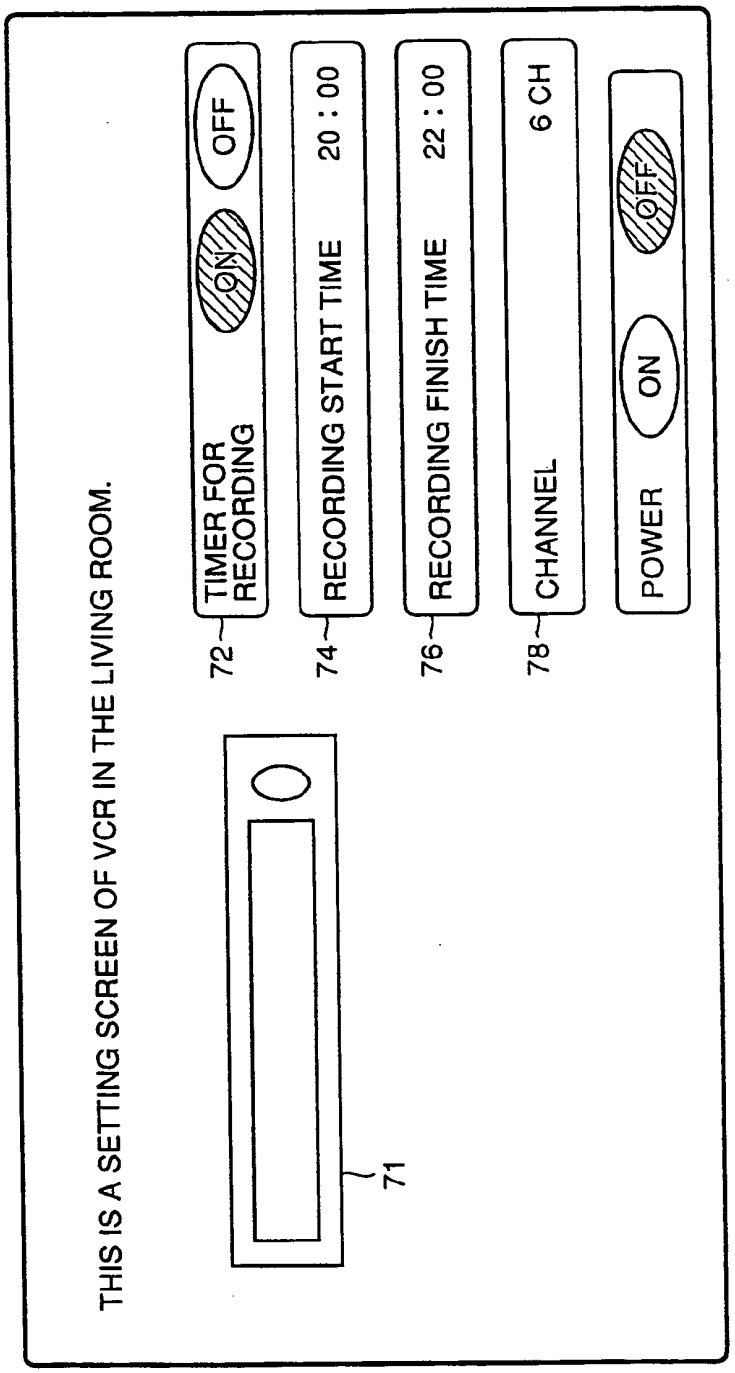

THIS IS A SETTING SCREEN OF VCR IN THE LIVING ROOM.
TIMER FOR RECORDING
ON
OFF
72
RECORDING START TIME 20 : 00
74
RECORDING FINISH TIME 22 : 00
76
CHANNEL 6 CH
78
POWER
ON
OFF
71

FIG. 12

FIG.13

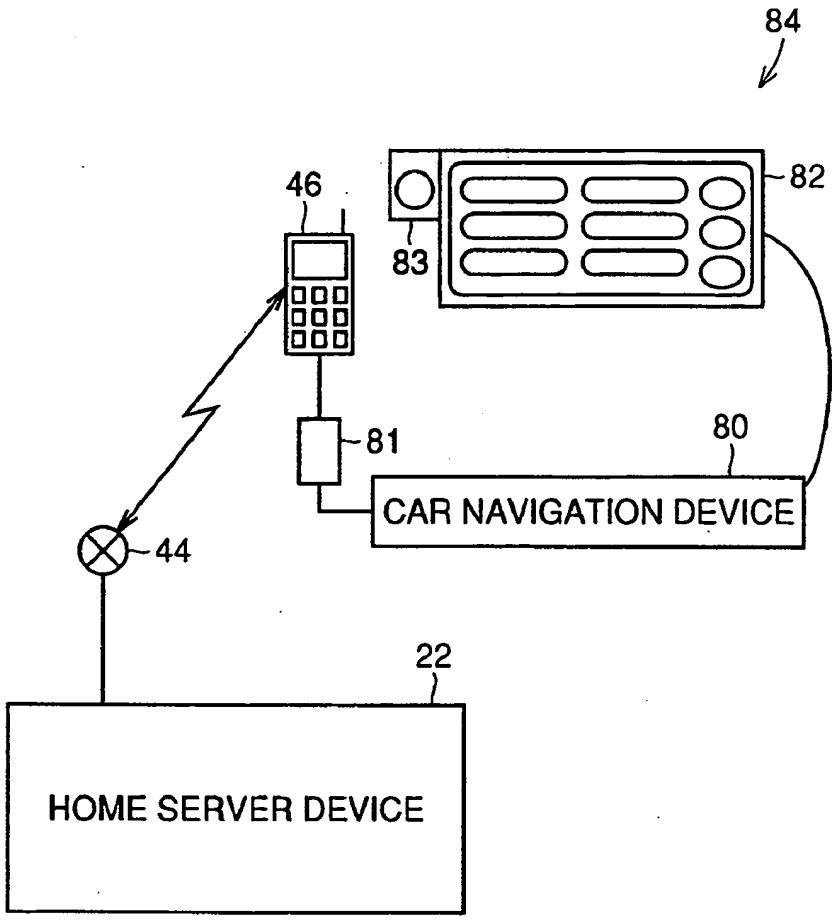

84
46
82
83
81
80
CAR NAVIGATION DEVICE
44
22
HOME SERVER DEVICE

FIG. 14

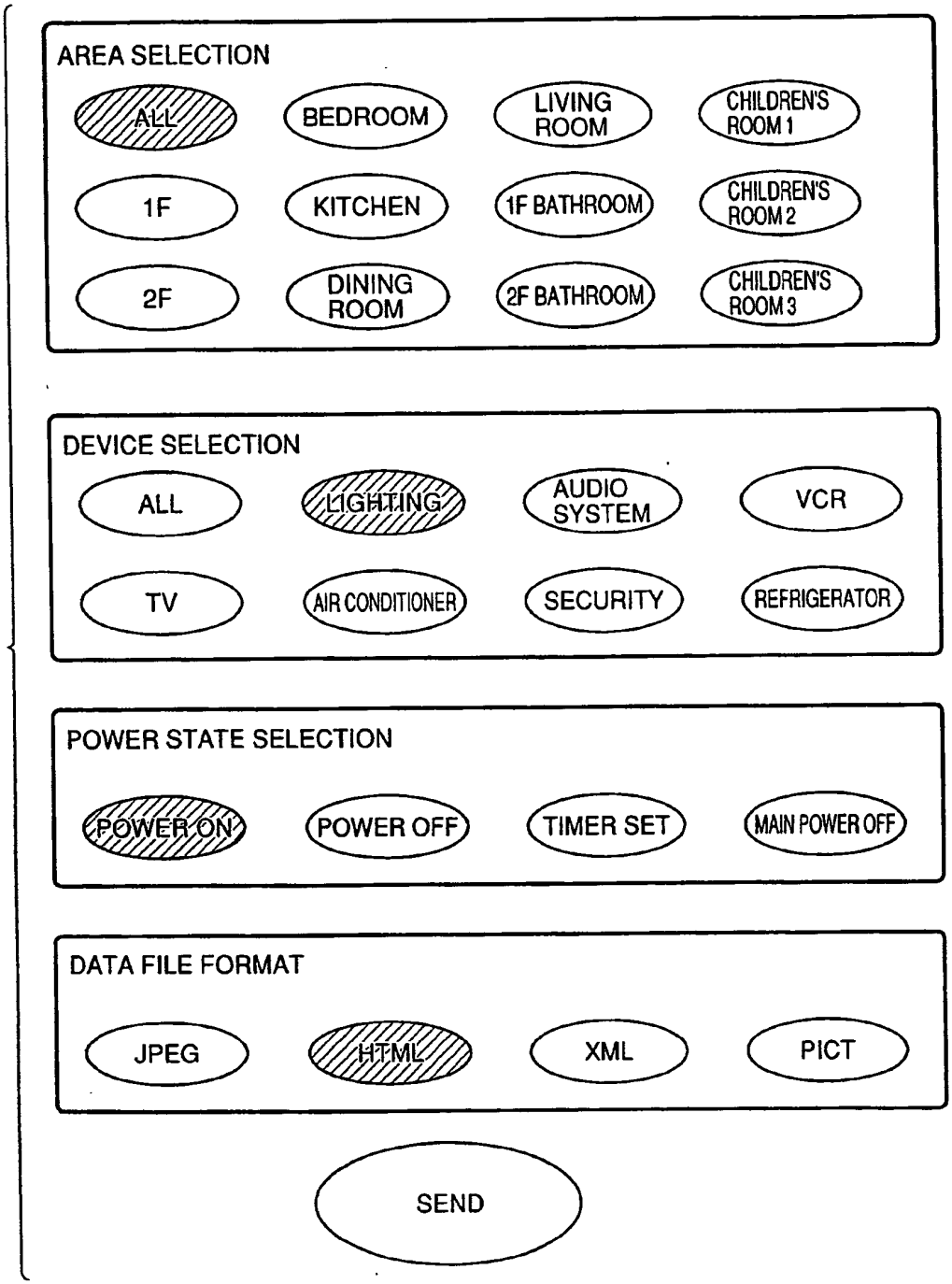

AREA SELECTION
ALL
BEDROOM
LIVING ROOM
CHILDREN'S ROOM 1
1F
KITCHEN
1F BATHROOM
CHILDREN'S ROOM 2
2F
DINING ROOM
2F BATHROOM
CHILDREN'S ROOM 3
DEVICE SELECTION
ALL
LIGHTING
AUDIO SYSTEM
VCR
TV
AIR CONDITIONER
SECURITY
REFRIGERATOR
POWER STATE SELECTION
POWER ON
POWER OFF
TIMER SET
MAIN POWER OFF
DATA FILE FORMAT
JPEG
HTML
XML
PICT
SEND

FIG.15

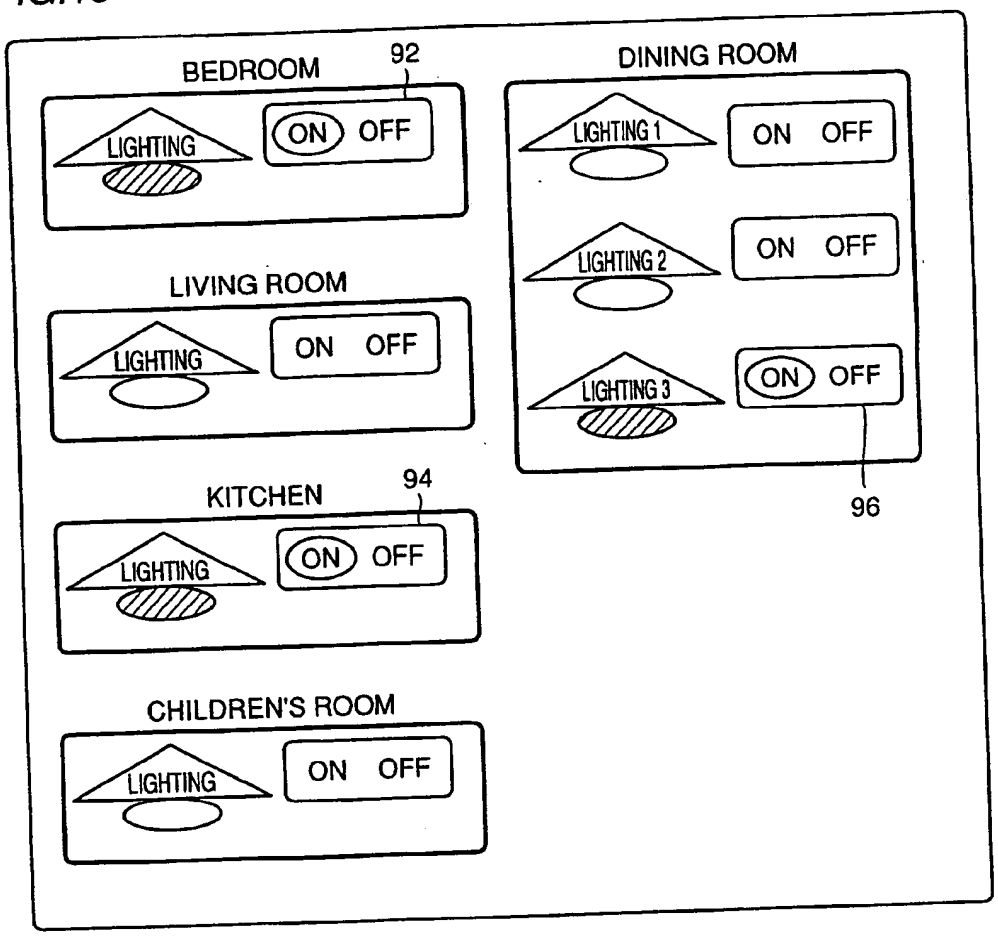

BEDROOM
92
LIGHTING
ON OFF
LIVING ROOM
LIGHTING
ON OFF
KITCHEN
94
LIGHTING
ON OFF
CHILDREN'S ROOM
LIGHTING
ON OFF
DINING ROOM
LIGHTING 1
ON OFF
LIGHTING 2
ON OFF
LIGHTING 3
ON OFF
96

FIG.16

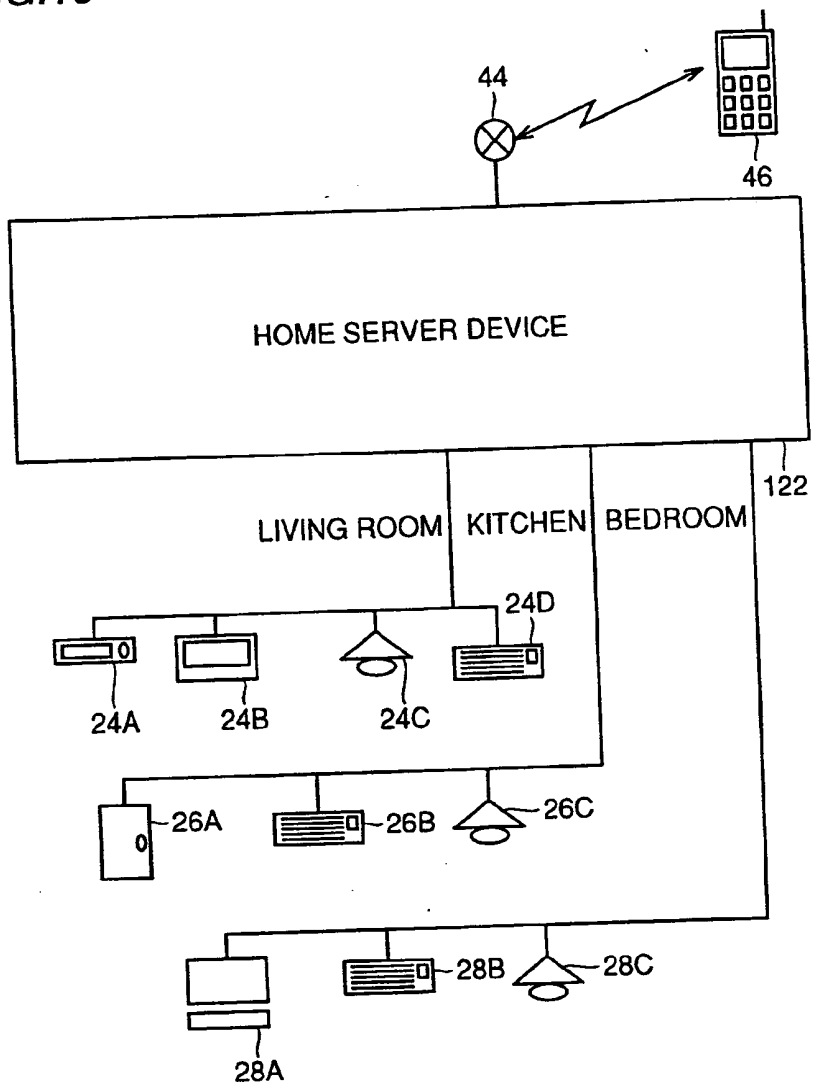
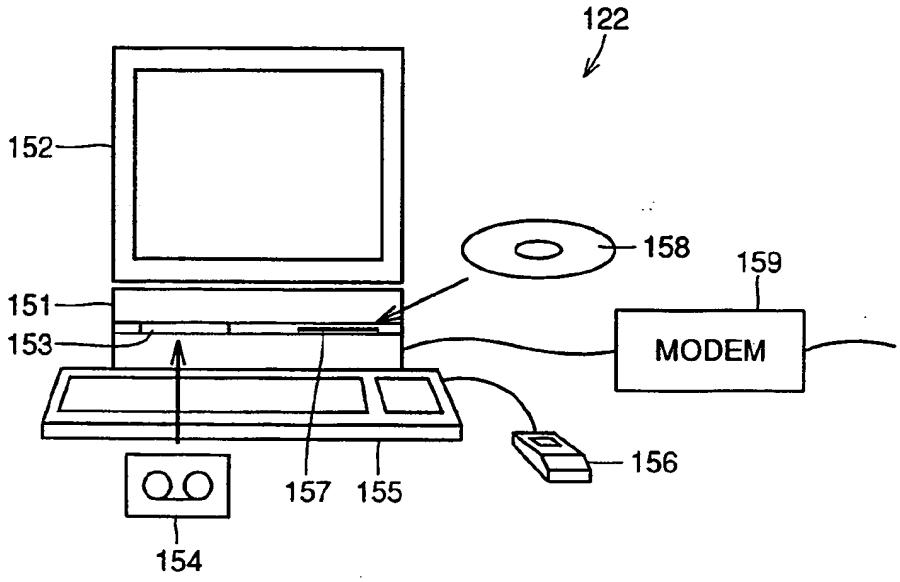

44
46
HOME SERVER DEVICE
122
LIVING ROOM
KITCHEN
BEDROOM
24D
24A
24B
24C
26A
26B
26C
28B
28C
28A

FIG.17



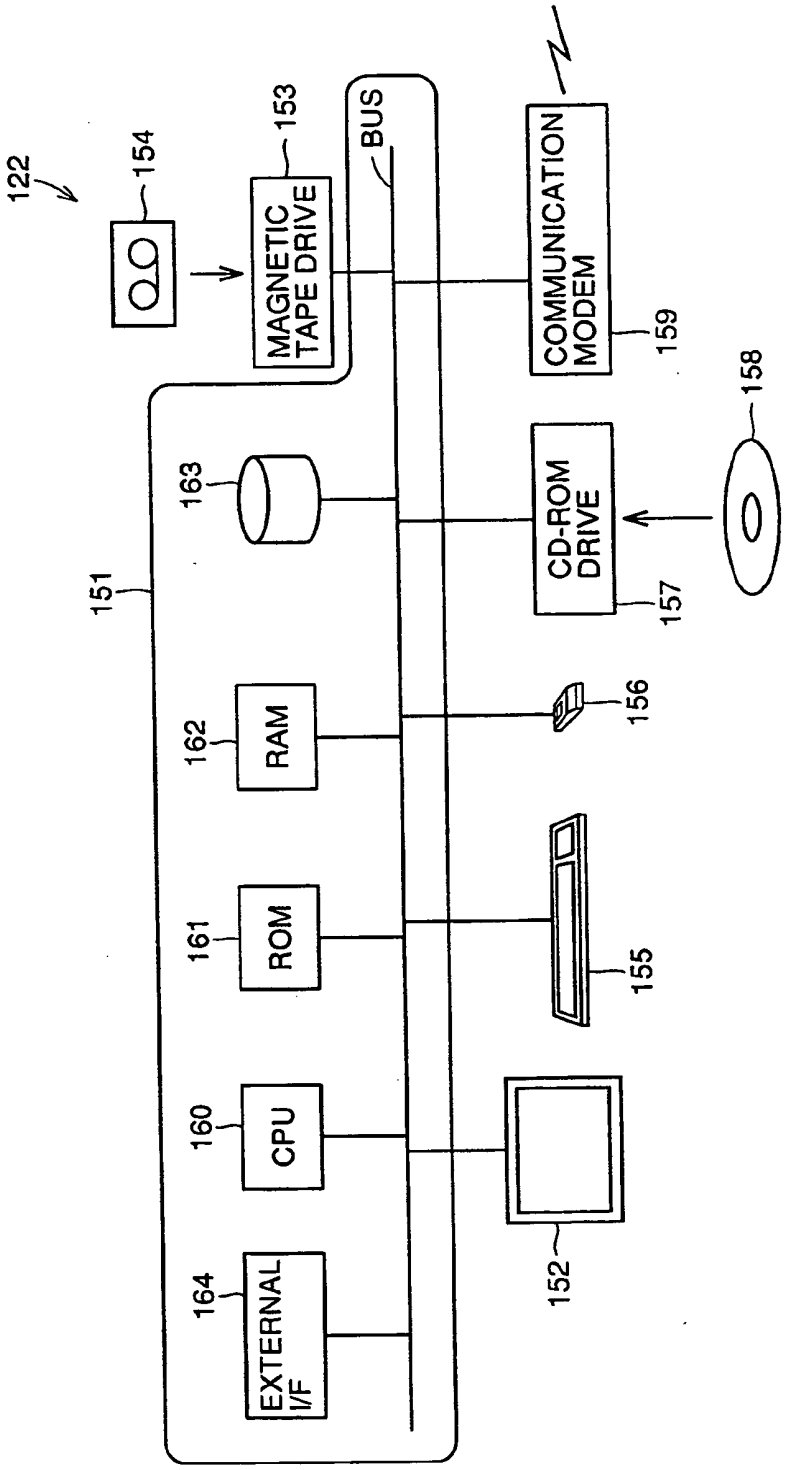

122
154
153
MAGNETIC TAPE DRIVE
BUS
COMMUNICATION MODEM
159
158
163
CD-ROM DRIVE
157
151
162
RAM
156
161
ROM
155
160
CPU
152
164
EXTERNAL I/F

FIG.18

HOME ELECTRONICS SYSTEM ENABLING DISPLAY OF STATE OF CONTROLLED DEVICES IN VARIOUS MANNERS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a home electronics system, and in particular to a home electronics system enabling display of a state of a controlled (target) device of user's interest with a simple operation.

[0003] 2. Description of the Background Art

[0004] A home server is known as an apparatus for remotely controlling devices such as a video cassette recorder (herein after referred to as "VCR") located in a household. The home server receives an instruction through a telephone set connected thereto via a public line to remotely control the target devices connected to the home server.

[0005] Some of the home servers may have a display connected thereto displaying the state of the controlled devices for a user to check the state of the devices.

[0006] When the home server displays the state of the controlled devices, however, the server can display the controlled devices connected thereto only in order, so that numerous operations may be required until the user reaches the controlled device of interest. In addition, this home server cannot make a display in compliance with the resolution of the display screen of a control terminal device or with the file format operable by the control terminal device. Therefore, it is impossible for the home server to be connected for use with various kinds of control terminal devices having different specifications.

[0007] It has thus been difficult, in the past, to simultaneously grasp the state of the controlled devices desired by the user, and to rapidly operate the controlled devices.

SUMMARY OF THE INVENTION

[0008] The present invention is directed to solve the problems described above, and an object of the invention is to provide a home electronics system in which a user can rapidly perform the remote operation of a controlled device.

[0009] Another object of the invention is to provide a home electronics system that can display a state of the controlled device with various resolutions.

[0010] A further object of the invention is to provide a home electronics system that can be used with a plurality of types of control terminal devices connected thereto.

[0011] A home electronics system according to one aspect of the present invention includes a control terminal device having a display function, a home server connected to the control terminal device via a communication network, and a controlled device connected to the home server for operating in response to a control signal. The control terminal device includes a retrieval condition transmitting unit for transmitting a retrieval condition for the controlled device, a display connected to the home server for displaying a state of the controlled device in response to data received from the home server, and a control signal transmitting unit for transmitting a control signal controlling the target device. The home server includes a state transmitting unit connected to the retrieval condition transmitting unit to create data indicating the state of the controlled device matching with the retrieval condition for transmitting to the control terminal device, and a device controlling unit connected to the control signal transmitting unit and the controlled device for controlling the target device in response to the control signal received from the control signal transmitting unit.

[0012] The controlled device matching with the retrieval condition transmitted by the control terminal device is selected and the state of the selected controlled device is displayed on the control terminal device. Thus, the user can rapidly obtain information on the desired controlled device and simultaneously and rapidly perform remote control of a plurality of controlled devices.

[0013] Preferably, the retrieval condition transmitting unit transmits a type condition of the controlled device. The condition transmitting unit creates data indicating the state of the controlled device matching with the type condition received, for transmitting to the control terminal device.

[0014] For example, when lighting is selected as a type of the controlled device, the state of all the lighting equipment in a house can be seen, so that a light inadvertently left on can be easily found. Thus, the user can rapidly obtain the information on the desired controlled device and simultaneously and rapidly perform the remote operation of a plurality of controlled devices.

[0015] More preferably, the retrieval condition transmitting unit transmits a state condition of the controlled device, and the condition transmitting unit creates data indicating the controlled device matching with the received state condition, for transmitting to the control terminal device.

[0016] For example, when the power "ON" is selected as a state of the controlled device, controlled devices indicating power can be easily found among the controlled devices in the whole house. Thus, the user can rapidly find any controlled device with the power left "on" and simultaneously and rapidly perform the remote control of these controlled devices.

[0017] More preferably, the home server further includes an icon memory unit for storing the icon of the controlled device. The state transmitting unit creates data including the icon and the state of the controlled device matching with the retrieval condition for transmitting to the control terminal device.

[0018] The data indicating the controlled devices with icons is created on the server side. Thus, the user can recognize the controlled device at a glance and a rapid remote operation is enabled.

[0019] More preferably, the control terminal device further includes a format-transmitting unit for transmitting a format of data received by the display. The state transmitting unit receives the format from the format-transmitting unit to transmit data in compliance with the format to the control terminal device.

[0020] The data of a format displayable in the control terminal device is transmitted by the home server. Thus, the user can remotely control the target device from various types of control terminal devices.

[0021] More preferably, the control terminal device further includes a resolution-transmitting unit for transmitting a resolution of data displayed on the display. The state transmitting unit receives the resolution from the resolution-transmitting unit and creates data having the resolution for transmitting to the control terminal device.

[0022] The data in compliance with the resolution of the display of the control terminal device is transmitted by the home server. Thus, the user can remotely control the target device from various types of control terminal devices such as a cellular phone or a personal computer.

[0023] The home server according to another aspect of the present invention is connected to the control terminal device having a display function as well as to a controlled device operating in response to a control signal. The home server includes a state transmitting unit connected to the control terminal device to create data indicating a state of the controlled device matching with a retrieval condition received from the control terminal device, for transmitting to the control terminal device, and a device control unit connected to the control terminal device and the controlled device for controlling the target device.

[0024] The controlled device matching with the retrieval condition transmitted by the control terminal device is selected, and the state of the selected controlled device is displayed on the control terminal device. Thus, the user can rapidly obtain the information on the desired controlled device and can simultaneously and rapidly perform remote control of a plurality of controlled devices.

[0025] In a computer readable recording medium according to a further aspect of the present invention, a program for a computer to perform as a home server is recorded. The home server is used in a home electronics system including a control terminal device having a display function, a home server connected to the control terminal device via a communication network, and a controlled device connected to the home server for operating in response to a control signal. The home server includes a state transmitting unit connected to the control terminal device to create data indicating the state of the controlled device matching with a retrieval condition received from the control terminal device, for transmitting to the control terminal device, and a device controlling unit connected to the control terminal device and the controlled device for controlling the target device in response to a control signal received from the control terminal device.

[0026] The controlled device matching with the retrieval condition transmitted by the control terminal device is selected, and the state of the selected controlled device is displayed on the control terminal device. Thus, the user can rapidly obtain the information on the desired controlled device and simultaneously and rapidly perform remote control of a plurality of controlled devices.

[0027] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] **FIG. 1** is a block diagram showing an arrangement of a home electronics system of the first embodiment of the present invention;

[0029] **FIG. 2** shows an example of a device information table;

[0030] **FIG. 3** is a flowchart showing a process executed by a home server;

[0031] **FIGS. 4A and 4B** are flowcharts showing a device operation process by a home server;

[0032] **FIG. 5** is an example of a display showing a user selection menu;

[0033] **FIG. 6** is an example of the display showing the user selection menu after selection;

[0034] **FIGS. 7 and 8** are examples of the display showing current state information;

[0035] **FIG. 9** shows a state of the home electronics system in which a personal computer system is used;

[0036] **FIG. 10** is an example of the display showing the user selection menu after the selection;

[0037] **FIGS. 11 and 12** are examples of the display showing the current state information;

[0038] **FIG. 13** shows a configuration of a home electronics system in which a car navigation system is used;

[0039] **FIG. 14** is an example of the display showing the mode selection menu after selection;

[0040] **FIG. 15** is an example of the display showing the current state information;

[0041] **FIG. 16** is a block view of the configuration of the home electronics system according to the second embodiment of the invention;

[0042] **FIG. 17** is an outline view of the home server; and

[0043] **FIG. 18** is a block diagram of the configuration of the home server.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0044] First Embodiment Referring to **FIG. 1**, a home electronics system according to the first embodiment of the present invention includes a home server **22**, a cellular phone **46** connected to home server **22** via a public line network **44**, and devices for control **24A** to **28C** controlled in response to a signal from home server **22**.

[0045] Home server **22** includes a communication unit **38** connected to a public line network **44**, an interface unit **42** connected to devices **24A** to **28C** for transmitting and receiving data to/from devices **24A-28C**, a memory **40** for storing information concerning the installation area or the state of devices **24A** to **28C**, a program ROM (Read Only Memory) **36** storing a program of remote control process of devices **24A** to **28C**, a configuration information input unit **34** for a user to input information concerning a change of the configuration of the devices in such a case that the installation area is changed or a device is added, and a microcomputer **32** connected to configuration information input unit **34**, program ROM **36**, communication unit **38**, memory **40** and interface unit **42** for controlling these units.

[0046] Microcomputer **32** includes a state transmitting unit (not shown) creating data indicating the state of devices

24A to 28C and transmitting to cellular phone 46, and a device control unit (not shown) for controlling devices 24A to 28C.

[0047] Communication unit 38 includes, for example, a communication modem or the like. Configuration information input unit 34 includes, for example, LCD (Liquid Crystal Display) with a touch panel or the like.

[0048] Devices 24A to 28C are classified by each area (a living room, a kitchen and a bedroom) of a house in which home server 22 is installed. In the living room, a VCR 24A, a television (hereinafter referred to as TV) 24B, a lighting equipment 24C and an air conditioner 24D are installed. In the kitchen, a security system 26A, an air conditioner 26B and a lighting equipment 26C are installed. In the bedroom, a personal computer 28A, an air conditioner 28B and a lighting equipment 28C are installed.

[0049] The information on the installation area or the state of these devices is stored in memory 40 of home server 22 as a device information table.

[0050] Referring to FIG. 2, an example of the device information table is described. In the device information table, the installed devices are classified by each installation area and stored. Each device information includes a type, a power state and the other additional states of the device. For example, it can be seen from the device information table shown in FIG. 2 that the power state of the VCR installed in the living room is "OFF" and the timer on the VCR is not set for recording.

[0051] Icon data is further stored in memory 40 for graphical representation of the devices by their types.

[0052] A process for operating the devices by home server 22 is described with reference to FIGS. 3 and 4A and 4B.

[0053] Referring to FIG. 3, home server 22 waits until it receives a call from outside (S2). The process described herein assumes that the server receives a call from cellular phone 46. When a call is received (YES in S2), microcomputer 32 sends a voice message of operation information that is pre-recorded and stored in memory 40 to cellular phone 46 connected upon the call. Microcomputer 32 would send a voice message such as "Hello. This is XX's home server. For recording a message, press #1. For listening to a message, press #3. If you wish to use the home network system, press #2."

[0054] Home server 22 waits until any button is pressed in response to the voice message on cellular phone 46. When the button operation using cellular phone 46 is performed, microcomputer 32 determines which button was pressed (S6, S10 and S14). If "#1" is pressed (YES in S6), the process for recording a voice message is executed (S8). If "#2" is pressed (NO in S6 and YES in S10), the process for operating the subsequently described devices connected to home server 22 is executed (S12). If "#3" is pressed (NO in S6, NO in S 10 and YES in S14), the process for reproducing the prerecorded voice message is executed (S16). If the other buttons are pressed (NO in S6, NO in S10 and NO in S14), the device operation process is terminated without any process execution.

[0055] Referring to FIGS. 4A and 4B, the process of S12 in FIG. 3 is described in detail.

[0056] Microcomputer 32 sends a voice message requiring the password, pre-recorded and stored in memory 40, to cellular phone 46 (S22). For example, microcomputer would send the voice message such as "please enter the password".

[0057] Microcomputer 32 waits until the user enters the password in response to the message (S24). When the password is entered (YES in S24), microcomputer 32 compares the entered password with the one pre-stored in memory 40 (S26). If the entered password is incorrect (NO in S26), the line connection is cut without executing any further process (S58).

[0058] If the entered password is correct (YES in S26), microcomputer 32 notifies that the access has been accepted, and sends the message to cellular phone 46 asking to enter the number of pixels for the display thereof and the file format of the data to be transferred thereto (S28). For example, microcomputer 32 sends a message such as: "Your access has been accepted. Please enter the number of pixels for the display screen and the file format of the data to be transferred."

[0059] Microcomputer 32 waits until data is input for this message (S30). When the data is input from cellular phone 46 (YES in S30), microcomputer 32 examines whether the data includes information concerning the number of pixels (32S). If it includes the number of pixels (YES in S32), the received number of pixels is set as the number of pixels for the display of cellular phone 46 (S34). If the number of pixels is not included (NO in S32), then the default number of pixels pre-stored in memory 40 is set as the number of pixels of the screen (S36).

[0060] Thereafter, microcomputer 32 examines whether information concerning the file format is included in the received data (S38). If the file format is included (YES in S38), the received file format is set as a file format for data transmission (S40). If the file format is not included (NO in S38), the default file format pre-stored in memory 40 is set as the file format for data transmission (S42).

[0061] For example, if the user enters "320×240" as the number of pixels for the display of cellular phone 46 and "XML (extensible Markup Language)" as the file format, these information are sent to home server 22 and are set as the number of pixels for the screen and the file format of the transmitting data.

[0062] Microcomputer 32 enlarges or reduces the display of the user selection menu as shown in FIG. 5 pre-stored in memory 40, to conform to the set number of pixels.

[0063] The user selection menu includes an area selection box in which buttons for selecting an area such as the living room, the kitchen or the bedroom are arranged, a device selecting box in which buttons for selecting a device such as the lighting equipment, the VCR or the TV are arranged, a power state selection box in which buttons for selecting a power state of a controlled device such as power "ON" or power "OFF" are arranged, and a data file format selection box in which buttons for selecting a file format such as JPEG (Joint Photographic Experts Group) or HTML (HyperText Markup Language) are arranged.

[0064] Microcomputer 32 converts the file format of the user selection menu to the set file format, and subsequently

sends the converted user selection menu to cellular phone **46** via communication unit **38** (S46).

[0065] Cellular phone **46** displays the received user selection menu on the display. Microcomputer **32** waits until it receives the selections entered by the user according to the user selection menu displayed on the display of cellular phone **46** (S48). Referring to **FIG. 6**, for example, assume that the user has made a selection to receive the information concerning the state of air conditioner **24**D in the living room in XML format. In this case, three selections of "living room", "air conditioner" and "XML" are sent to home server **22** from cellular phone **46**.

[0066] When communication unit **38** received the user selections (YES in S48), microcomputer **32** would read out the necessary information from the device information table shown in **FIG. 2** according to the received selections to create an image of the current state information (S50). For example, in the above-described embodiment, the information concerning air conditioner **24**D in the living room is read out from the device information table for creating the image of the current state information as shown in **FIG. 7**. The image of the current state information is enlarged or reduced such that its number of pixels conforms to the number of pixels set in S34 or S36, that is, the one used to create the user selection menu. The state of air conditioner **24**D in the living room is displayed in the current state information, which indicates "the air conditioner turns on at 00:00, the operating temperature is 26° C., the wind level is set high, and the current state of the power is OFF."

[0067] Microcomputer **32** converts the image of the current state information to the file format designated in S48, and subsequently sends it to cellular phone **46** via communication unit **38** (S52). If the file format is not designated in S48, microcomputer **32** converts the file format according to the same file format as the one designated in S40 or S42.

[0068] The current state information is displayed on the display of cellular phone **46**. The user operates the cursor key of cellular phone **46** while looking at the displayed current state information to set the state of air conditioner **24**D. For example, to turn on the air conditioner in the living room at 20:00 for operating at medium wind level, the operation as described below is performed. Referring to **FIG. 8**, the user brings the cursor onto the icon of air conditioner **24**D and clicks the icon. Next, in order to set the operation start time, cursor is moved onto a box **52** and "2000" is entered. Likewise, the user moves the cursor onto a box **54** to enter "25" and then onto a box **56** to select "2 medium".

[0069] Microcomputer **32** waits until it receives the entered or selected instruction (S54). If the instruction is received (YES in S54), microcomputer **32** operates the controlled device according to the instruction (S56). For example, in the embodiment described above, timer-setting process is executed for turning on air conditioner **24**D in the living room at 20:00 to operate at the medium wind level.

[0070] Thereafter, configuration information input unit **34** cut off the telephone connection (S58) and terminates the process in S12 shown in **FIG. 3**.

[0071] Though the remote control of the devices connected to home server **22** via cellular phone **46** was described in the example above, a personal computer or the like may be used in place of cellular phone **46** to remotely control the devices connected to home server **22**.

[0072] [First Alternative Example of Remote Control of Devices]

[0073] An example of remotely controlling the VCR in the living room by a personal computer system **65** is described with reference to **FIG. 9**.

[0074] Personal computer system **65** includes a personal computer **60**, and a display **63**, a keyboard **62**, a mouse **64** and a modem **61** respectively connected to personal computer **60**. Modem **61** is connected to home server **22** via a public line network **44**.

[0075] In response to the process of S28 in **FIG. 4A**, assume that the user has entered 1024×768 as the number of displayable pixels for display **63** and HTML as the file format. Referring to **FIG. 5**, the user selection menu is converted to the HTML file format and subsequently sent to personal computer system **65** (S46). Personal computer system **65** displays the received user selection menu of HTML format on display **63**.

[0076] Referring to **FIG. 10**, the user selects the required mode according to the user selection menu displayed on display **63**. Here, in order to receive the information concerning the state of VCR **24**A in the living room in JPEG format, the user presses the buttons denoted as "living room""VCR" and "JPEG", and then presses the "send" button. By pressing the "send" button, the three selected conditions are transmitted from personal computer system **65** to home server **22**.

[0077] When communication unit **38** receives the selection input (YES in S48), microcomputer **32** reads out the necessary information from the device information table shown in **FIG. 2** according to the received selection to create the image of the current state information of 1024×768 pixel as shown in **FIG. 11** (S50). In the current state information, the state of VCR **24**A in the living room is displayed. This state information shows that the timer of VCR **24**A is not set for recording and the current state of the power is OFF.

[0078] The created image of the current state information is compressed into JPEG format and is sent to personal computer system **65** (S52).

[0079] Personal computer **60** receives the JPEG-compressed image of the current state information via modem **61** and extracts the image to be subsequently displayed on display **63**. The user operates keyboard **62** or mouse **64** while looking at the displayed current state information to set the state of VCR **24**A. For example, to record the TV program on channel 6 for 2 hours from 20:00, the operation performed is as follows. Referring to **FIG. 12**, the user moves the cursor onto icon **71** of VCR **24**A and clicks the icon. Thereafter, the user moves the cursor onto a box **72** for setting the timer for recording and selects "ON". Further, the user moves the cursor onto a box **74** to set the start time for recording and enters "20:00" using keyboard **62**. Likewise, in boxes **76** and **78**, "22:00" and "6" are respectively entered to set the finish time for recording and the channel.

[0080] Microcomputer **32** receives the entered or selected instruction (YES in S54) and sets the timer of VCR **24**A for recording according to the instruction (S56).

[0081] [Second Alternative Example of Remote Control of Devices]

[0082] Referring to **FIG. 13**, an example of remotely controlling the lighting in a household using a car navigation system **84** is described.

[0083] Car navigation system **84** includes a car navigation device **80**, an LCD with touch panel **82** connected to the car navigation device, a built-in speaker **83** connected to the car navigation device, and a cellular phone **46** connected to a cellular phone connecting port **81** of car navigation device **80**. Cellular phone **46** is connected to home server **22** via public line network **44**.

[0084] In response to the process of S28 in **FIG. 4A**, assume that the user operates the buttons of cellular phone **46** to enter 640×480, which is the display number of pixels of LCD with touch panel **82**. The entered number of pixels is set in S34. As to the file format, it is noted that the default file format (HTML for example) is used since the file format is not designated. (S42).

[0085] Referring to **FIG. 5**, the user selection menu of 640×480 pixels is created (S44) and converted to the HTML file format, and then sent to car navigation device **80** (S46). Car navigation device **80** displays the received data in HTML format on LCD with touch panel **82**.

[0086] Referring to **FIG. 14**, the user makes selections of request according to the user selection menu displayed on LCD with touch panel **82**. Here, in order to receive the information concerning all the lighting equipment inadvertently left on in all areas of the household, the user presses the buttons denoting "all", "ighting", "power ON" and "HTML", and then presses "send" button. By pressing "send" button, the four selections are transmitted from car navigation device **80** to home server **22** via cellular phone **46**.

[0087] When communication unit **38** receives the selection input (YES in S48), microcomputer **32** reads out the necessary information from the device information table shown in **FIG. 2** according to the received selections to create the image of the current state information of 640×480 pixel as shown in **FIG. 15** (S50). The image shows icons and boxes indicating the states for each lighting equipment in all areas. The icon of lighting equipment indicating power is displayed differently from the other icons, and the portions denoting "ON" in the boxes are marked by a circle so as to show that the power is ON. From this state information, it can be seen that the lighting equipment in the kitchen and the dining room are left on.

[0088] The created image of the current state information is converted to HTML format and then transmitted to cellular phone **46** (S52).

[0089] Car navigation device **80** receives the current state information in HTML format via cellular phone **46** for display on LCD with touch panel **82**. The user turns off the lighting inadvertently left on while looking at the displayed image of the current state information. That is, the user touches the portions denoted as "OFF" in boxes **92**, **94** and **96**.

[0090] Microcomputer **32** receives the selected instructions (YES in S54) and turns off the lighting which has been inadvertently left on, according to the instruction (S56).

[0091] Though, in the example above, the telephone connection is cut after executing the operation of the devices connected to home server **22**, it is also possible to send a voice message or a screen for confirming the setting details from home server **22**. Further, instead of the parallel arrangement of the icons of the devices to be controlled and their states as shown in **FIG. 15**, the states may be displayed after clicking the icons of the devices to be controlled.

[0092] Moreover, to save the communication cost, line connection may be made only when the data is sent.

[0093] According to the home electronics system of the present embodiment as described above, it is possible to remotely control the devices in a household from a control terminal device such as a cellular phone having a display screen, and the states of the devices can be displayed for each of the installation area, the state and the type of the devices. Thus, it is possible for the user to rapidly obtain the information desired, to simultaneously perform remote control of a plurality of devices and to rapidly operate the devices.

[0094] Furthermore, the resolution of the display screen and the displayable file format can be designated. Thus, the devices connected to home server **22** can be controlled by a plurality of types of control terminal devices.

[0095] Second Embodiment

[0096] Referring to **FIG. 16**, a home electronics system according to the second embodiment of the present invention includes a home server **122**, a cellular phone **46** connected to home server **122** via public line network **44** and devices to be controlled **24A** to **28C** connected to home server **122**.

[0097] Referring to **FIG. 17**, home server **122** includes a computer **151**, a keyboard **155** and a mouse **156** for instructing computer **151**, a display **152** for displaying the result or the like operated by computer **151**, a magnetic tape drive **153** for reading the programs executed by computer **151**, a CD-ROM (Compact Disc-Read Only Memory) drive **157** and a communication modem **159**.

[0098] Referring to **FIG. 18**, computer **151** includes a CPU (Central Processing Unit) **160** for executing the programs read via magnetic tape drive **153**, CD-ROM drive **157** or communication modem **159**, ROM (Read Only Memory) **161** for storing the other programs and data required to operate computer **151**, RAM (Random Access Memory) **162** for storing the programs, parameters on executing the programs, operation result or the like, a magnetic disc **163** for storing the programs or data, an external I/F (interface) **164** connected to devices **24A** to **28C**, and a bus for interconnecting the components of computer **151** with the components of home server **122**.

[0099] The program realizing home server **122** is recorded in magnetic tape **154** or CD-ROM **158**, which is a recording medium readable by computer **151**, and is respectively read out by magnetic tape drive **153** and CD-ROM drive **157**. Alternatively, it is read by communication modem **159** via the communication line.

[0100] The program executed in CPU **160** is the one for realizing the process displayed by the flow chart in **FIGS. 3**, **4A** and **4B**. The process executed by home server **122** is

similar to that of home server **22** in the first embodiment. Thus, the detailed description thereof will not be repeated here.

[0101] According to the present invention, the user can rapidly obtain the information on the desired controlled devices, and simultaneously and rapidly performs remote control of a plurality of controlled devices.

[0102] Further, the state of the controlled devices can be displayed in various resolutions.

[0103] Moreover, the controlled devices can be remotely controlled by various types of control terminal devices such as a cellular phone, a personal computer system or the like.

[0104] Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

What is claimed is:

1. A home electronics system, comprising:

a control terminal device having a display function;

a home server connected to said control terminal device via a communication network; and

a target device connected to said home server for operating in response to a control signal;

said control terminal device including

a retrieval condition transmitting unit for transmitting a retrieval condition for said target device,

a display connected to said home server for displaying a state of said target device in response to data received from said home server, and a control signal transmitting unit for transmitting a control signal controlling said target device;

said home server including

a state transmitting unit connected to said retrieval condition transmitting unit to create data indicating the state of said target device matching with said retrieval condition for transmitting to said control terminal device, and

a device controlling unit connected to said control signal transmitting unit and said controlled device for controlling said target device in response to the control signal received from said control signal transmitting unit.

2. The home electronics system according to claim 1, wherein:

said retrieval condition transmitting unit transmits a type condition of the target device; and

said condition transmitting unit creates data indicating the state of said target device matching with said type received condition, for transmitting to said control terminal device.

3. The home electronics system according to claim 1, wherein:

said retrieval condition transmitting unit transmits a state condition of the target device; and

said condition transmitting unit creates data indicating said target device matching with said received state condition, for transmitting to said control terminal device.

4. The home electronics system according to claim 1, wherein:

said retrieval condition transmitting unit transmits a condition of an area where said target device is installed; and

said state transmitting unit creates data indicating the state of said target device existing in an area matching with said received area condition for transmitting to said control terminal device.

5. The home electronics system according to claim 1, wherein:

said home server further includes an icon memory unit for storing an icon of the target device; and

said condition transmitting unit creates data including the icon and the state of the target device matching with said retrieval condition for transmitting to said control terminal device.

6. The home electronics system according to claim 1, wherein:

said control terminal device further includes a format-transmitting unit for transmitting a format of data received by said display; and

said state transmitting unit receives said format from said format-transmitting unit to transmit data in compliance with said format to said control terminal device.

7. The home electronics system according to claim 1, wherein:

said control terminal device further includes a resolution transmitting unit for transmitting a resolution of data displayed on said display; and

said state transmitting unit receives said resolution from said resolution transmitting unit and creates data having said resolution for transmitting to said control terminal device.

8. A home server connected to a control terminal device having a display function as well as to a target device operating in response to a control signal, comprising:

a state transmitting unit connected to said control terminal device to create data indicating a state of said target device matching with a retrieval condition received from said control terminal device, for transmitting to said control terminal device, and

a device controlling unit connected to said control terminal device and said target device for controlling said target device in response to the signal received from said control terminal device.

9. The home server according to claim 8, wherein said state transmitting unit creates data indicating a state of said target device matching with a type condition of said target device transmitted by said control terminal device, for transmitting to said control terminal device.

10. The home server according to claim 8, wherein said state transmitting unit creates data indicating a state of said target device matching with a state condition of said target device received from said control terminal device.

11. The home server according to claim 8, wherein said state transmitting unit creates data indicating a state of said target device existing in an area matching with an area condition received from said control terminal device for transmitting to said control terminal device.

12. The home server according to claim 8, further comprising:

an icon memory unit for storing an icon of the target device, wherein:

said state transmitting unit creates data including the icon and a state of said target device matching with said retrieval condition.

13. The home server according to claim 8, wherein:

said state transmitting unit receives a signal indicating a format from said control terminal device to transmit data in compliance with the format to said control terminal device.

14. The home server according to claim 8, wherein:

said state transmitting unit receives a signal indicating a resolution from said control terminal device to create data having the resolution for transmitting to said control terminal device.

15. A computer readable recording medium, in which a program for a computer to perform as a home server is recorded, wherein:

said home server is used in a home electronics system including a control terminal device having a display function, a home server connected to said control terminal device via a communication network, and a target device connected to said home server for operating in response to a control signal; and

said home server including

a state transmitting unit connected to said control terminal device to create data indicating a state of said target device matching with a retrieval condition received from said control terminal device, for transmitting to said control terminal device, and

a device controlling unit connected to said control terminal device and said target device for controlling said target device in response to a control signal received from said control terminal device.

16. The computer readable recording medium according to claim 15, wherein:

said state transmitting unit creates data indicating a state of said target device matching with a type condition of said target device transmitted by said control terminal device.

17. The computer readable recording medium according to claim 15, wherein said state transmitting unit creates data indicating a state of said target device matching with a state condition of said target device received from said control terminal device.

18. The computer readable recording medium according to claim 15, wherein said state transmitting unit creates data indicating a state of said target device existing in an area matching with an area condition received from said control terminal device.

19. The computer readable recording medium according to claim 15, wherein said state transmitting unit receives a signal indicating a format from said control terminal device for transmitting data in compliance with the format to said control terminal device.

20. The computer readable recording medium according to claim 15, wherein said state transmitting unit receives a signal indicating resolution from said control terminal device to create data having the resolution for transmitting to said control terminal device.

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(54) **REMOTE CONTROL HAVING TOUCH PAD TO SCREEN MAPPING**

(75) Inventors: **Jack A. Segal**, Oxnard, CA (US); **William Allen Yates**, Camarillo, CA (US); **Steven B. Branton**, Ventura, CA (US); **Jeff Mossontte**, Oxnard, CA (US)

(73) Assignee: **Interlink Electronics, Inc.**, Camarillo, CA (US)

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(58) **Field of Search** 345/173, 180, 345/182, 184, 1, 2, 169, 327, 328, 326, 864, 716, 717, 718; 348/734, 564, 569, 906; 178/18.01, 18.03, 18.05

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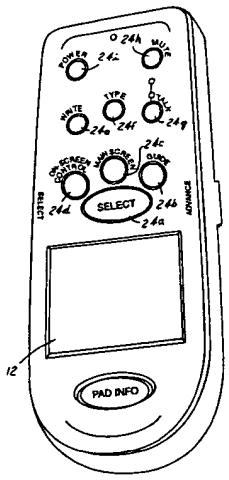
Primary Examiner—Chanh Nguyen
(74) *Attorney, Agent, or Firm*—Brooks Kushman P.C.

(57) **ABSTRACT**

A remote control for controlling a home entertainment (HE) device such as an Interactive television having a display screen. The remote control includes a touch pad mapped to the display screen of the HE device as a function of the ratio of the areas of the touch pad and the display screen such that each location of the touch pad corresponds to a respective location of the display screen. The remote controller further includes a controller operable with the touch pad to enable a control function associated with a location of the display screen in response to the corresponding location of the touch pad being touched for controlling the HE device. The display screen may include on-screen keyboards, control panels and menus, an Internet page, an electronic program guide, and the like.

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